DOCUMENT RESUME

ED 253 025 EC 171 358

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TITLE Creativity and Hypermnesia.
PUB DATE Aug 84
NOTE 15p.; Paper presented at the Annual Convention of the American Psychological Association (92nd, Toronto, Canada, August 24-28, 1984).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS College Students; *Creative Thinking; *Creativity; Higher Education; *Imagery; *Recall (Psychology)
IDENTIFIERS *Hypermnesia

ABSTRACT

The study was conducted to examine the relationship between hypermnesia (spontaneous recovery of previously unretrievable information without access to retrieval cues) for concrete and abstract words and creative thinking abilities in two groups of 30 undergraduates each. Ss were asked either to form an image or to construct a meaningful sentence for each stimulus word presented. The words were either highly imageable or difficult to image. A forced recall procedure was used over three successive trials. Tests of creative thinking were administered during the interim periods. In both groups, more high-imagery words were recalled, and hypermnesia for easily imaged words was higher than for abstract words. Ss who exhibited the imagery-hypermnesia effect performed higher on the creativity tests than did those who failed to achieve this effect, adding support for a relationship between imagery and creativity. The hypermnesia effect occurred even though the mind was consciously occupied with other tasks. (Author)

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Creativity and Hypermnesia

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Running Head: CREATIVITY AND HYPERMNESIA

Paper presented to the Meeting of the American Psychological Association, August, 1984, Toronto.

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Abstract

This study was conducted to examine the relationship between hypermnesia for concrete and abstract words and creative thinking abilities. Subjects were asked either to form an image or to construct a meaningful sentence for each stimulus word presented. These words were either highly imageable or difficult to image. A forced-recall procedure was used over three successive trials. Tests of creative thinking were administered during the interim periods. In both groups, more high-imagery words were recalled and hypermnesia for easily imaged words was higher than for abstract words. Subjects who exhibited the imagery-hypermnesia effect performed higher on the creativity tests than did those who failed to achieve this effect, adding support for a relationship between imagery and creativity. The hypermnesia effect occurs even though the mind is consciously occupied with other tasks.

Creativity and Hypermnesia

Creativity and imagery have been linked for many years in both theoretical and subjective accounts (Ghiselin, 1957), and recent investigations have added supporting experimental evidence (Forisha, 1978; Shaw, 1984a, 1984b; Shaw and Belmore, 1982-83; Shaw and DeMers, 1983a, 1983b). An aspect of imagery which has not before been tested in connection with the creative process in imagery-hypermnesia.

Hypermnesia, variously referred to as incremental recall or reminiscence, is the spontaneous recovery of previously unretrievable information without access to retreival cues. Erdelyi et al. (1976) stated that this "negative forgetting" phenomen for image is "powerful and highly reliable." Roediger and Thorpe (1978) found that recall increases over time even without multiple-retrieval trials. More recently, Belmore (1981) has shown that hypermnesia accompanies meaningful processing of words of high and low imagery value, although she also found that more high-imagery words were recalled.

While the topic of creativity has been of interest over the years, there has been no universal acceptance of its definition or of methods for its measurement (Getzels, 1975). The creative process was described by Wallas (1927) as being composed of four stages: preparation (hard, conscious work), incubation (involuntary, unconscious work), illumination (an instantaneous flash of insight), and verification (a second period of conscious work). The cognitive effects of hypermnesia and incubation may be similar to each other.

This study involved the examination of the relationship between hypermnesia for concrete (high-imagery) and abstract (low-imagery) words and creative thinking abilities in a group of 60 undergraduates. It was hypothesized that those subjects who showed the hypermnesia effect for high-imagery words would obtain higher scores on the creativity tests.

Method

Two separate groups of 30 subjects each (undergraduates who received course credit) were asked

either to form an image of each word or to construct a meaningful sentence for each word (Belmore, 1981). The 40 stimulus words were all high in printed frequency (according to ratings by Thorndike and Lorge, 1944), and either highly imageable (e.g., horse) or difficult to image (e.g., justice) as rated by Paivio, Yuille and Madigan (1968). A forced-recall procedure was used (Erdelyi et al., 1976) over three successive trials. The hypermnesia effect for high-imagery words, low-imagery words and group instruction (sentence or image) served as an independent variables. Two widely used tests of creative thinking developed by Torrance (1966), Circles and Just Suppose, were chosen to measure creativity and to serve in combination as the dependent variable. The two creativity tests were administered in the interim periods with half of the subjects receiving the Circles test first and the other half receiving the Just Suppose Test first. To insure that the groups were of approximately the same level of intelligence, the Shipley- Institute of Living Scale (SILS, Shipley, 1967) was administered.

Results

To determine that the two groups were approximately equal, t-tests were computed for all variables. These results showed that the same in intelligence and creativity levels. Generally, the data showed that more high-imagery words were recalled by both groups than were low-imagery words, and that the proportion of high to low imagery was not different between the groups (see Table 1). It was also

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Insert Table 1 about here

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the case that the mean hypermnesia effect for easily imaged, concrete words was greater in both groups that for abstract words (see Table 1). Information regarding gender was gathered, but was of no statistical significance in this study.

The results of two-way analysis of variance showed that those subjects who exhibited the imagery-hypermnesia effect (hypermnesia for high-imagery words) performed significantly higher on the creativity tests than did those who did not show this effect (F (1,56) = 27, $p < .0001$; see Table 2). There was no significant effect for group treatment; the number of

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Insert Table 2 about here

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subjects who exhibited the imagery-hypermnesia effect was about the same in both the sentence and image groups (see Table 2).

The data for low-imagery words were also submitted to two-way ANOVA and all effects were found to be nonsignificant at the .05 level of probability. Incidentally, the hypermnesia effect for low-imagery words was stronger in the sentence group (11 subjects) than in the image group (6 subjects, see Table 1).

There was no significant interaction effect for imagery-hypermnesia and group instruction. It can be seen in Figure 1 that, in both groups,

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Insert Figure 1 about here

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on the average, hypermnesia-present subjects had higher creativity scores than hypermnesia -absent subjects.

Conclusions

Despite instructions to encode information either verbally or imaginally, both groups produced more pronounced hypermnesia for easily imaged words. This supports the contention of Ederly et al. (1976) that enhanced memory for imagery is very strong.

The imagery-hypermnesia effect occurs to a greater extent in creative subjects even though their minds are consciously occupied with other tasks. If this enhanced memory for imagery is put into the context of subjective accounts of the creative process in which memory is crucial to original thinking, the implications are far reaching. Information in a creatively useful form is available for the transformation which is necessary to produce novel ideas. The ability to use imagery seems to have a role in the creative process, and may be an important individual difference related to creative thinking. These data provide additional evidence of the relationship between imagery and creativity.

The nonconscious processes used in the incubation stage of the creative process should be further defined and explored. While the mechanism for hypermnesia appears to be nonconscious, it is not known whether the

same underlying cognitive processes are used in both hypermnesia and incubation. It is the case, however, that the commonly held distinction between 'accessible' and 'available' information is evident in this study. Perhaps the most interesting question deals with whether the ability to use these previously inaccessible memory stores is of any practical importance to the individual who can do so, and under what conditions available memory becomes accessible.

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Table 1

Means, Standard Deviations and Ranges for All Variables

SENTENCE GROUP (M=10, F=20)

	M	SD	RANGE
SILS-Verbal	27.4	4.2	14 - 34
SILS-Abstraction	33.8	4.7	20 - 40
Circles	56.3	21.8	20 -107
Suppose	29.2	8.5	11 - 48
Total Creativity	115.6	32.0	56 -183
Low-imagery words (trial 1)	8.5	2.8	2 - 14
High-imagery words (trial 1)	11.5	3.0	5 - 16
Hypermnesia, low-imagery*	19.7	1.4	17 - 2[illegible]
Hypermnesia, high-imagery*	20.7	2.0	17 - 26
Total Hypermnesia*	20.5	2.4	16 - 25

IMAGE GROUP (M=12, F=18)

	M	SD	RANGE
SILS-Verbal	29.4	4.8	21 - 39
SILS-Abstraction	34.5	4.6	16 - 40
Circles	64.2	17.5	39 -112
Suppose	33.2	10.7	11 - 54
Total Creativity	129.0	29.9	73 -199
Low-imagery words (trial 1)	8.8	3.4	4 - 17
High-imagery words (trial 1)	12.0	2.9	6 - 19
Hypermnesia, low-imagery*	19.2	1.5	17 - 23
Hypermnesia, high-imagery*	20.0	2.8	14 - 26
Total Hypermnesia*	19.4	3.6	13 - 26

Note.
*Hypermnesia was computed on the basis of total points added to or subtracted from 20, depending on whether the hypermnesia effect was present or not present.
Note.
The total creativity score was derived by doubling the verbal creativity score (Just Suppose) and adding the figural creativity score (Circles).

Table 2

Analysis of Variance:
Hypermnesia for High-Imagery Words

Dependent Variable: Total Creativity

SOURCE	DF	SS	F	P
Hypermnesia (present or absent)	1	18031.94	27.00	0.0001
Group (sentence or image)	1	2292.76	3.43	0.07
Group*Hypermnesia	1	242.22	0.36	0.55
Error	56	37396.37	-	-

Note.
Sentence group: Hypermnesia present N=14
Hypermnesia absent N=16
Image group: Hypermnesia present N=15
Hypermnesia absent N=15

Analysis of Variance:
Hypermnesia for Low-Imagery Words
All effects were nonsignificant.

Note.
Sentence group: Hypermnesia present N=11
Hypermnesia absent N=19
Image group: Hypermnesia present N= 6
Hypermnesia absent N=24

Figure 1

Means for Creativity Scores for Sentence and Image groups showing Hypermnesia for High-Imagery Words